

The Determinants of Labor Market Institutions: A Panel Data Study

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Abstract

This paper analyzes the argument that labour market institutions can be thought of devices for social insurance. It investigates the hypotheses that a country's exposure to external risk and ethnic fractionalization are correlated with labor market institutions. Extreme bounds analysis with the panel data of 40 years indicates that there is no evidence of positive correlation between external risk and the structure of labor market institutions, while ethnic fractionalization is robust negatively correlated with the institutions.

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1 Introduction

There has been a widespread belief that rigidities imposed by labour market institutions cause long-term high unemployment in Europe. In the middle of the 1990s, the OECD released a series of publications recommending labour market deregulation as a remedy for the high and persistent unemployment problem.¹ Since then, a large literature has been developed about the effects

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¹See *inter alia* "The OECD Jobs Strategy: Enhancing the Effectiveness of Active Labor Market Policies (1996)" and "Implementing the OECD Jobs Strategy: Member Countries' Experience (1997)."

of labour market institutions on economic performance. Nickell and Layard (1999) argued that the existence of strong unions and generous and long-lasting unemployment benefits can raise unemployment and lower economic growth. Similarly, Elmeskov et al. (1998) suggested that strict regulations on firing, high tax wedge, and generous unemployment benefits create structural unemployment in the OECD countries. However, what they overlook is the potential endogeneity of those institutions.

This study instead looks at labour market institutions from the opposite direction and explains why such labour market institutions are created in the first place. It investigates two hypotheses for why some countries have so-called "rigid" labour market institutions, while others have developed more flexible labour markets. The first hypothesis is that a country's exposure to external risk affects the structure of labour market institutions. The idea starts from Rodrik's (1998) analysis on the correlation between a country's exposure to international trade and the size of its government. According to Rodrik (1998), since public sector is relatively safe against external risk, more open countries tend to develop larger public sectors. Agell (1999, 2002) also viewed labour market institutions as devices to reduce external risk. He argued that globalization, on one hand, increases the efficiency costs associated with labour market institutions. On the other hand, it may also lead to an increased demand for labour market institutions to protect workers from increasing external risk. Hence, it is not obvious whether a country's exposure to international trade leads to more or less rigid labour market institutions.

The second hypothesis is that the degree of ethnic fractionalization is related to the structure of labour market institutions. Both theoretical implications and empirical evidence by Alesina et al. (1999) support that ethnic fragmentation of a society is a determinant of institutions. Different ethnic groups often rep-

resent diversified preferences and income levels, which makes it difficult to pool resources together to provide public goods. This paper examines the similar logic for labour market institutions. A country with highly heterogeneous ethnic groups tends to develop labour market institutions that follow *laissez-faire*, while the homogeneous counterpart tends to develop labour market institutions that are organized collectively.

The empirical analysis is based on a novel panel dataset, which is rich in institutional content and in longitude. The dataset of 20 OECD countries over 40 years contains not only the data on government consumption and social security transfers, which are analyzed by Rodrik (1998), but also institutions such as net union density, generosity and duration of unemployment benefits, employment protection. This enables us to extend Rodrik's (1998) argument to more institutions, and to analyze a more homogeneous sample of countries. Furthermore, this study enriches Agell's (2002) analysis, which uses cross-sectional data of 25 OECD countries, by having a panel data dimension going back to 1960. Another distinctive contribution of this study is the systematic sensitivity analysis. The results of empirical studies with macroeconomic data are often sensitive to the set of conditioning variables. To obtain robust results, I use the extreme bounds analysis (EBA) along the lines of Levine and Renelt (1992).

I found less clear-cut results than those of Rodrik (1998). Exposure to external risk is not positively correlated with the institutions. I obtain a highly robust negative correlation between ethnic fractionalization score and several institutions. The result is consistent with Alesina et al. (1999) and Agell (2002). Ethnic fractionalization is widely accepted as an exogenous variable. Hence, the correlation between ethnic fractionalization and the structure of labour market institutions can be interpreted as causation. However, as is always the case in studies using aggregate data, it is almost impossible to make a conclusion of an

indisputable causation.

The remainder of this paper is organized as follows. In the following section, I review a theoretical model by Rodrik (1998) on the relationship between openness to international trade and institutions. The section also discusses the role of ethnic fragmentation in determining the structure of institutions. In section 3, I discuss the econometric methodology and present the data. Section 4 presents the results from the baseline regression and the extreme bounds analysis. Section 5 discusses endogeneity issues, and Section 6 concludes. In appendix A, all variables and their sources are described in detail.²

2 The Theoretical Background

2.1 Rodrik's Model on the Role of Openness

The model shows how government spending through final good consumption can provide social insurance in an economy subject to external risk. The summary of the model is as follows. Assume a small open economy. In this economy, a fixed supply of a domestically manufactured good x is exported at the price π , which is the price of the export good in terms of an import good. It is stochastic and distributed with mean π_m and variance σ_π^2 . Beside the export good, the economy produces two additional goods; a publicly produced good and a private good, which are perfect substitutes in consumption. The economy's labour endowment is normalized to unity, with λ the share of the publicly employed workers and $1 - \lambda$ employment in the private sector. For simplicity, all imports are assumed to be intermediate goods used to produce private goods. The production function for the private sector is linear in labour. Under the as-

²Appendix I and II, which are available from the author upon request, provide detailed results from the EBA and summaries the EBA results using data between years 1960 and 1994, and between years 1960 and 1989.

sumption that trade must be balanced continuously, the economy can afford πx of intermediate goods. With these intermediate goods, the private sector produces $Q(1 - \lambda)$, letting production unit parameter $Q \equiv \pi x$. The supply of the publicly produced good is $g(\lambda)$, which is at least twice-differentiable with $g' > 0$ and $g'' < 0$. The government maximizes the expected utility of a representative household, $u(\cdot)$, where $u' > 0$ and $u'' < 0$, by determining the optimal level of public employment λ^* , before the terms of trade π is known. The government's problem is

$$\text{Max}_{\lambda} V(\lambda) \equiv E[u(g(\lambda) + Q(1 - \lambda))].$$

A second-order Taylor expansion around the mean π_m and the mathematical expectation give

$$\begin{aligned} V(\lambda) \equiv E[u(g(\lambda) + Q(1 - \lambda))] &\simeq \\ u(g(\lambda) + x\pi_m(1 - \lambda)) &+ \frac{1}{2}x^2(1 - \lambda)^2\sigma_{\pi}^2 u''(g(\lambda) + x\pi_m(1 - \lambda)). \end{aligned}$$

The first-order condition is then

$$\left[u(\cdot)' + \frac{1}{2}z^2(1 - \lambda)^2 u(\cdot)''' \right] [g'(\lambda) - x\pi_m] - (1 - \lambda)z^2 u(\cdot)'' = 0, \quad (1)$$

where the term $z \equiv x\sigma_{\pi}$ is a measure of the country's exposure to external risk. It is obvious that the last term of the left-hand side of equation (1) is positive. If the household is assumed to be prudent, $u(\cdot)''' > 0$, the first square bracket of the left-hand side is also positive. Then, it must be that $g'(\lambda) < x\pi_m$ if the first order condition is to hold.

Under full certainty, where $z = 0$, the government will find that it is optimal to set the share of public employment λ^* at the point where the marginal product of public production equals the marginal product of private production, $g'(\lambda) =$

$x\pi_m$. If the economy is subjected to positive external risk $z > 0$, the public employment should be set at the level where $g'(\lambda) < x\pi_m$. Due to convexity of the public sector production function, this gives an intuitive implication that as external risk increases, it is optimal to increase the size of the public sector.

This simple model provides an important link to the first hypothesis on the relationship between external risk and labour market institutions. In Rodrik's model, the government's device to provide social insurances are limited to public production. In fact, many of the OECD countries can use other social insurance devices such as unemployment insurance and employment protection legislation. Hence, countries exposed to larger external risk due to globalization will have strong incentives to develop comprehensive labour market institutions.³ Lindbeck (1975) argued that through extensive labour market policies which include not only unemployment compensation, but also subsidies to firms to retain and retrain workers, as well as through large increase in public employment, governments can smooth out shocks in an open economy.

2.2 The Role of Ethnic Fractionalization

Another possible determinant of the structure of labour market institutions is the degree of ethnic fractionalization. Economists have been arguing that public policy and ethnic fragmentation are strongly correlated. From a model, where an individual can choose between non-excludable public good and private good, Alesina et al. (1999) explain that if there is preference polarization, people would prefer to keep taxes low and devote more resources to private consumption rather than public consumption. Although the model refers to preference polarization of the conflict among interest groups, the authors argue that it is strongly associated with ethnic fragmentation. This happens for two

³See Agell (1999).

reasons. One is that different ethnic groups have different preferences over how public goods to be supplied. For example, an ethnic group with relatively low economic condition would like to have more extensive public provision of transportation, schools, and health service, while those with better economic status prefer less public provision that may give lower tax. The second argument is that each ethnic group's utility level for a given public good is reduced if other groups also use it. They explained this mechanism as disutility in rivalry. As a result, more ethnic fragmentation leads to fewer resources pooled together to provide non-excludable public goods such as social insurances. Likewise, an ethnically homogenous country is more likely to have stronger support for social insurances through extensive labour market institutions.

From the historical evidence comparing the United States and Sweden in the late 19th century, Agell (2002) points out that it appears to have been more difficult to build up labour market institutions that are organized along collective lines in an environment with largely heterogeneous ethnic groups. While it may turn out to be conflicts of interests among heterogeneous groups in polarized countries such as the United States, a country with a largely homogenous population can provide a higher degree of social insurances through labour market institutions. This is why this study investigates whether or not ethnic diversity affects the structure of labour market institutions.

3 Method and Data

There have been a number of empirical studies that identify determinants of institutions. Most studies of this literature have predominantly presented results from a few regressions. There is no systematic sensitivity analysis being done. Reporting the estimates from a few specifications often gives misleading inferences, because the estimated coefficients on explanatory variables might depend

on the selection of control variables.

Systematic sensitivity analysis is essential, since these results are often fragile, in the sense that they are only valid conditional on a specific set of control variables. Leamer (1985) was the first to develop "Global Sensitivity Analysis." Levine and Renelt (1992) later adopted a particular version of this sensitivity analysis. My empirical investigation follows their method of the extreme bounds analysis (EBA) to identify robust factors of labour market institutions. I first describe the procedure of the EBA, and then turn to discuss the choice of variables.

3.1 Method of Extreme Bounds Analysis

The extreme bounds analysis (EBA) starts from an equation of the form

$$Y = \beta_I I + \beta_M M + \beta_Z Z + u, \quad (2)$$

where Y is the dependent variable, M a set of explanatory variables, which are the variables of interest, I a set of control variables always included in the regression, and Z a subset of conditioning variables taken from the full set of potentially relevant variables.⁴ u is an error term.

The procedure of the EBA is as follows. First, I run a base regression that includes only the I - and the M -variables. Then, I estimate the model including all possible linear combinations of up to three Z -variables.⁵ The basic idea of an EBA is to analyze the consequences of changing the set of conditioning variables Z for the estimated effect of the M -variables on the dependent variable.

⁴The difference between the I -variables and the Z -variables is that the I -variables are "standard" control variables in aggregate data analysis, while the Z -variables are possible additional economic explanatory variables, which according to the literature may be related to the structure of institutions.

⁵Restricting the total number of the RHS. variables helps to reduce problems of multicollinearity.

Hence, I identify the highest and lowest values for the coefficient estimates on the M -variables, β_M .⁶ The extreme upper and lower bounds are defined as the maximum value of $\hat{\beta}_M + 2\hat{\sigma}_M$, respective, the minimum value of $\tilde{\beta}_M - 2\tilde{\sigma}_M$.⁷ The M -variable is referred to be "robust," if the coefficient estimates are significant at the 5% level in all regressions and of the same sign at the two extreme bounds.

These criteria of robustness are strict. Sala-i-Martin (1997) argues that almost all hypotheses will be rejected if one applies the strict EBA criteria. He instead considers the entire distribution of the estimated coefficients. Alternatively, Widmalm (2001) simply relaxes the level of significance from 5 to 10 percent level. I assess the robustness as Widmalm (2001).

3.2 Data

This study examines the hypothesis that a country's exposure to external risk and ethnic fractionalization are correlated with the structure of labour market institutions using panel data. The equation to estimate is

$$Y_{it} = c_i + \delta_t + \beta_I I_{it} + \beta_M M_{it} + \beta_z Z_{it} + u_{it}, \quad (3)$$

where Y_{it} is an index of a labour market institution, I_{it} a vector of the control variables that are always included, Z_{it} a vector of the conditioning variables that are selectively included as potential explanatory variables, M_{it} a vector of the variables of my primary interest. δ_t and c_i are a time-specific, respective, a country-specific effect. The term u_{it} is a usual residual.

⁶In Appendix I, which is available from the author upon request, I call the highest and lowest values of the beta coefficients as "high" and "low".

⁷ $\hat{\beta}_M$ and $\hat{\sigma}_M$ denote the maximum value of the coefficient estimates and its standard error. $\tilde{\beta}_M$ and $\tilde{\sigma}_M$ denote the equivalent for the minimum value.

I choose the fixed effects model.⁸ It is generally more appropriate than a random effects model for cross-country data for two reasons. Firstly, if the individual effect represents omitted variables, it is highly likely that these country-specific characteristics, given by c_i , are correlated with the other regressors. The fixed effects estimator is consistent in the presence of time-constant omitted variables that can be arbitrarily correlated with the observable covariates. Secondly, it is also fairly likely that a macro panel will contain most of the countries of interest. Thus, it will be less likely to be a random sample from a much larger universe of countries.

The panel data consist of 20 OECD countries over the period of 1960-99. Among them are 15 European countries, and the rest are Australia, Canada, Japan, New Zealand, and the United States.⁹ Since I focus on the long-term factors that are associated with labour market institutions, all observations are compiled averages starting from year 1960-64 and ending with 1995-99, which makes 8 time periods.

In this paper, a number of labour market institutions are analyzed. The dependent variables are duration and replacement rate of unemployment benefits (BD and BRR), employment protection (EP), tax wedge (TW), net union density (UDNET), and civilian government employment as a percentage of the working age population (GOVEMP). Indices for the first five institutional variables are taken from "Labour Market Institutions Database" by Nickell and Nunziata (2001). Figures 1-5 show the development of labour market institutions.

⁸I ran the Hausman specification test including all control and explanatory variables. For indices of benefit replacement rate, social security transfer, tax wedges, and net union density, χ^2 exceeds 30, which indicates that there is evidence that supports a fixed effects model above a random effects model. For the rest of the institutional indices, no significant differences of the zero-correlation of the unobserved heterogeneity c_i and the covariates assumption are observed.

⁹The 15 European countries are Austria, Belgium, Denmark, Finland, France, Germany, Ireland, Italy, the Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, and the United Kingdom. Up until 1989, Germany refers to West Germany.

Figure 1 shows the benefit duration index. This index is constructed as a weighted average of the wage replacement received during the first five years of unemployment. If the benefit provision stops after one year, then the BD-index is 0. If the benefit provision does not depend on unemployment duration, it is 1. The development of BD-index is notably different from the stylized facts on labour market institutions. For example, Sweden, which is a representative country with extensive labour market institutions, has one of the lowest after Japan in practice.¹⁰

The benefit replacement rate attributes to first year of before tax unemployment benefits averaged over family types of recipients. The benefits are a percentage of average earnings before tax. Since 1970, there has been a great gap in the development of benefit replacement rate between the European countries and the non-European countries as is shown in Figure 2.

Figure 3 shows development of the employment protection index. Southern European countries such as Italy, Portugal, and Spain have typically the strictest employment protection, while the United States, the United Kingdom, and Canada have less extensive regulations.

The tax wedge is equal to the sum of employment tax rate, direct tax rate, and indirect tax rate. The TW-index is highest in Sweden over all periods; see Figure 4. The net union density is constructed as the ratio of total reported union members to the number of wage and salary earners. It is highest in Sweden and lowest in the United States over all periods; see Figure 5.

I also analyze civilian government employment as a percentage of the working age population between 15 and 64 (GOVEMP). Rodrik (1997) shows that countries that are greatly exposed to external risk have higher level of government employment.

¹⁰This is due to the fact that duration of unemployment benefit in Sweden is formally maximum 300 days .

Beside these labour market institutions, government consumption (GOVC) and social security transfer (SSTRAN) as percentages of GDP are also investigated. The relation between openness and these two variables is previously analyzed by Rodrik (1998) over a shorter time period. I include these institutions, since they might provide some guidance to compare the results for labour market institutions. Table 1 describes the descriptive statistics for all dependent variables.

The M -variables, the factors of my primary interest, are variables measuring a country's exposure to external risk and ethnic heterogeneity. To capture external risk, I use two variables *exrisk* and *lnopen*. The variable *exrisk* is a product of openness and volatility in terms of trade. The variable *lnopen* is natural logarithm of openness. Cameron (1978) was the first one to argue that the openness of an economy is the best single predictor of the growth of public economy. Rodrik (1998) found a positive relationship between spending on social security and welfare and exposure to external risk for the OECD countries. With the cross-country data, Rodrik (1997) showed evidence that exposure to external risk is closely associated with levels of government employment. Figure 6 shows development of openness. All 20 countries become more open over time. Smaller countries such as Denmark, Belgium, and Netherlands tend to be more open than larger countries such as the United States.

Another M -variable is a measure of ethnic fractionalization *ethkrain*, taken from Krain (1997). This index is constructed by calculating the proportion of the population of each ethnic group to the total population of the country, and then squaring it. The squared proportions for all groups are summed, and that number is then subtracted from 1 (Krain, 1997). A high score, such as Canada's 0.75, indicates many groups with small or relatively equal percentage of the population. A low score, such as Japan's 0.01, indicates that population is very

homogenous. In empirical literature, an ethno-linguistic fractionalization index is widely used in cross-sectional analyses. I use the new ethnic fractionalization index by Krain (1997) for my panel data application, since linguistic cleavages do not always correspond to ethnic ones, and the index is available over a longer time period. However, there are some properties of the ethnic fractionalization data that are doubtful. One of the most significant problems is that the last observation for data collection ends in year 1978. Krain (1997) simply continued the observation until year 1990, which corresponds to the period 1995-99 in my panel dataset, since I use lagged values on this variable. Furthermore, since it is observed in every 10 years, it fails to describe short-term variation of ethnic fractionalization. For example, the data describes that Sweden becomes more homogenous over time, which does not reflect the latest 10 years.¹¹ Despite such weaknesses, the data has been widely used in political science literature. To avoid problems with missing observations and to increase robustness of the results, I conduct robust check with the data of the first 35 years and 30 years. The overall results of this study is unaffected by the potential problems of the ethnic fractionalization data.¹²

Agell (2002) found significant negative correlations between ethno-linguistic fractionalization and some of the labour market institutions. This supports the hypothesis that countries with homogenous populations are more prone to develop extensive labour market institutions. Figure 7 shows the changes of ethnic fractionalization scores of selected countries over 40 years. There is very little variation on the ethnic fractionalization score, since a large-scaled migration that change ethnic proportion is a phenomenon that happens over a much longer period of time than 40 years.

¹¹According to information from the Swedish Migration Board, the number of foreign nationals in Sweden has been the highest during years 1990-95.

¹²The summary results of this robust check are reported in Appendix II, which are available from the author upon request.

The *I*-variables, which are always included in the regressions, should be undoubtedly argued as basic underpinnings of institutions. I choose natural logarithms of GDP per capita *lngdpc* and total population *lnpopul*.¹³ The former measures economic affluence of citizen of a country. According to Wagner's (1883) law, one can expect that citizen's demands for public services are increasing in economic affluence. However, Cameron (1978) acknowledged that the rate of growth in the economic affluence of a country does not contribute to the expansion of the public economy. Whereas one cannot expect whether GDP per capita is positively or negatively associated with labour market institutions, it is necessary to control for the degree of economic affluence of a country.

The base variable *lnpopul* is a proxy to the size of the country or the size of total labour force. Alesina and Wacziarg (1998) argued that smaller countries have a larger share of public consumption in GDP, and are also more open to trade. Instead of the direct link between openness and government size, they argued that the link is mediated by country size. Large countries can afford to have smaller government and get benefits from a sizable domestic market. Moreover, Wallerstein's (1989) cross-national analysis found a negative relationship between the size of the labour force and unionization rates. Controlling for country size is, therefore, necessary in order to extract the effect of openness on labour market institutions.

The potential conditioning variables, *Z*-variables, are drawn from those argued by other studies as determinants of the labour market institutions. I first choose the dependency ratio, which is equal to the number of persons younger than age 15 and older than age 65 divided by the number of persons of working age. Intuitively, government consumption and social security transfer necessarily increase in dependency, since the recipients of social welfare increase. Rodrik

¹³In many empirical studies in political economy and economic growth literature, GDP per capita and population are often chosen as control variables. See Levine and Renelt (1992), and Wildmalm (2001)

(1998) showed a highly significant positive correlation between the dependency ratio and the share of government consumption in GDP.

Labour market institutions may also reflect changes in the economic structure. In order to capture the changes in industrial structure, I include civilian employment in industrial sector as a percentage of total civilian employment. Blaschke (2000) argued that unionization rates are usually higher in industry and the public sector, and lower in agriculture and private sectors.

Political attitude is controlled by the variable *right*. This is the cabinet composition of right-wing parties in percentage of total cabinet posts weighted by days. Intuitively, right-wing parties are commonly thought of as favoring flexibility in a labour market, while left-wing parties favoring more regulation. Cameron (1978) argued that whether a nation's government was generally by leftist parties or by non-leftist parties provides a strong clue to the relative degree of change in the scope of the public economy. Saint-Paul (1996) also acknowledged that the existence of a right-wing government slows down the growth rate of minimum wage.

In addition, I include the financial openness index *lnfinopen* in the set of Z -variables. The range of this financial openness index is $[0, 14]$ increasing with the degree of openness in financial institutions. Svaleryd and Vlachos (2002) argued that there exists a significant relationship between financial development and openness to trade. Financial openness might affect labour market institutions due to its risk-sharing feature. Other things being equal, a country with highly open financial institutions has a better chance of risk-sharing. It may, therefore, have relatively less incentive to use labour market institutions as a device of risk-sharing. In other words, financial institutions might work as a substitute to labour market institutions in risk-sharing.

Finally, I include unemployment rate as a potential factor that is associ-

ated with labour market institutions. Agell (2002) argued that risks of being unemployed call for social insurances via labour market institutions. Then, institutions such as generosity and duration of unemployment benefits might increase in unemployment rate. Elmeskov et al. (1998) reported a highly significant evidence of causality from high unemployment to high unemployment benefits and tax wedge. Saint-Paul (1996) remarks that higher exposure to unemployment facilitates a reduction in the level of employment protection. On the other direction of causality, Blanchard and Wolfers (1999) argued that the interaction between shocks and institutions is crucial to explaining unemployment. To reduce the obvious problem of reverse causality, I use lagged values of the unemployment rate. The unemployment rate is used only as a conditioning variable, rather than as a primary explanatory variable. In other words, I am interested in whether including or excluding the unemployment rate changes the relationship between the M -variables and the indices of labour market institutions. The direct effect of unemployment rates on labour market institutions is beyond the scope of this study. Table 2 shows the descriptive statistics for the right-hand side variables.

4 Results

This section discusses the results from extreme bounds analysis (EBA) of the 8 institution variables. First, I estimate the baseline regressions that include only the I - and M -variables; see Table 3. From the baseline estimations, we do not find any strong evidence for the positive association between openness and the institutions. Only the benefit replacement rate index is positively correlated with *errisk*, and social security transfer and tax wedge are positively correlated with *lnopen*. The degree of government consumption, social security transfer, and government employment, which were found to be positively cor-

related with the measures of external risk in the previous studies, are neither positively correlated with country's exposure to external risk. The degree of ethnic fractionalization, GDP per capita, and population are negatively correlated with most of the institutions with exception of benefit duration. This indicates that countries with heterogenous ethnic groups, higher GDP per capita, as well as larger population, tend to have relatively lax institutions.¹⁴

To investigate robust determinants of labour market institutions, the extreme bound analysis is performed. Table 4 presents the summary of the extreme bounds analysis of the 8 institution variables¹⁵. As the baseline estimations find no evidence of the positive correlation between country's exposure to external risk and the degree of rigidity of labour market institutions, the coefficients on *exrisk* and *lnopen* are mostly insignificant.¹⁶ Unexpectedly, openness is negatively correlated with civilian government employment in the strict definition of robustness, which means that countries with highly open to trade tend to have relatively lower government employment. The negatively correlation between the measure of ethnic fractionalization and the labour market institutions such as benefit replacement rate, tax wedge, and net union density, as well as government consumption and government employment is highly robust. This is a strong evidence supporting the second hypothesis that countries with ethnically heterogeneous population have less encompassing institutions compared to those with homogeneous population.

To examine if the results depend on the range of countries included, I perform a sensitivity test with the 15 European countries. The results are summarized in Table 5. The EBA results using only the data of 15 European countries

¹⁴The OLS analysis with robust standard errors on base regressions indicates that *lnopen* is positively correlated all institutions except GOVEMP. The variable *ethkrain* is negatively correlated with EP, GOVC, SSTRAN, TW, and UDNET at the 5% significance level.

¹⁵The fully detailed results of the EBA is displayed in Appendix I, which is available from the author upon request.

¹⁶When a variable is insignificant or in wrong sign from the base equation, it is denoted as "Fragile (0)".

are somewhat different. Countries with larger exposure to external risk, *exrisk*, tend to have less generous unemployment benefit in terms of duration, which is a clear opposite of the first hypothesis. The degree of ethnic fractionalization is now robust negatively associated with the institutions such as employment protection, government consumption, social security transfer, and net union density.

The extreme bounds analysis suggests the following findings. First, in contrast to the theory on labour market institutions as social insurance devices against external risk, there is no evidence of simple positive correlation between country's exposure to external risk and the structure of labour market institutions. The relationship between government consumption or social security transfer as percentages of GDP and country's openness, which were argued to be positive by the previous studies, turned out to be insignificant in several specifications. The failure to verify the first hypothesis may come from the fact that labour market institutions as social insurance devices can entail efficiency costs due to the rigidities. Rigidities of labour market institutions involve both benefits by providing security net against external risk and costs from, for instance, slow adjustment to labour demand or lower price-competitiveness in the global economy, as Agell (2002) argued. Hence, the policy makers may consider both the benefits and the costs from so-called rigidities of labour market institutions.

Second, indices for benefit replacement rate, government consumption, government employment, tax wedges, and net union density are negatively correlated with the ethnic fractionalization score, which is robust in the strict definition of robustness. This implies that countries with ethnically homogeneous populations are prone to develop labour market institutions organized more collectively, while the counterparts with heterogeneous population tend to develop more flexible institutions. This is another strong evidence that public policy

and ethnic fractionalization are strongly associated. Alesina et al. (1999) found a negative relationship between productive public good provision and ethnic fragmentation in the U.S. local levels. Easterly and Levine (1997), who used ethnic diversity data as measured by language, also reported a strong negative correlation across countries between ethnic diversity and indicators of public goods. Extending the previous studies, the result implies that ethnic fragmentation is an important determinant of institutions, not only to the matter of public finances and provision, but also to several features in labour market institutions. Results from the linear regression analysis are often not sufficient enough to assure a causal relationship. However, the ethno-linguistic fractionalization score has been frequently used as an instrument in growth and political economy literature. It is considered to be exogenous in a relatively short time period such as 40 years. It would, therefore, be less disputable to conclude that the ethnic fractionalization score is a determinant of labour market institutions.

5 Endogeneity Issues

In the previous section, I found no correlation between labour market institutions and the measures of external risk. Can one now conclude that labour market institutions are not devices for social insurance against external risk? The empirical results of political economy should be handled with caution. The analysis is based on the assumption that the variables for country's exposure to external risk are exogenous. It might, however, contain endogeneity problems.

Endogeneity of the explanatory variables can arise from three sources. Firstly, there might be omitted variables. By using fixed effects model, unobserved time-constant country effects are controlled for. It is nevertheless not able to control for unobserved time-variant effects such as technological change or business cycle that each country encounters asymmetrically. Another suspect omitted factor

is a variable that captures eventual efficiency cost from rigidity imposed by the labour market institutions. If labour market institutions entail not only welfare benefit by providing social insurance but also efficiency cost, as Agell (2002) argues, including a variable that characterizes welfare cost might give different results.

Secondly, the analysis might contain measurement errors. The measurement errors primarily come from proxy variables. In this analysis, I used various proxies, for example, GDP per capita and cabinet composition of right-wing parties to describe the effects that are not directly observable such as economic affluence of citizen and tendency of citizen being rightists. Also, the variable describing the interaction between openness and annual terms of trade volatility may not be a sufficient measure of a country's exposure to external risk. Measurement errors, especially those of independent variables, can typically give parameters estimates biased toward zero.

Finally, the variables, *exrisk* and *lnopen*, might be determined simultaneously along with the institutions. Some regulations in labour market can distort production and reduce a country's export. Koeniger (2001) argued that binding minimum wages makes countries produce relatively more in unskilled labour intensive industries. It lowers the comparative advantage in the production of the skill-intensive good, which in turn can reduce the countries openness or terms of trade.

6 Conclusion

In the 1990s, there have been bustling discussions on how various institutions of labour market affect a country's economic performance. The discussions often ended up with comments that deregulation is a panacea to most of the economic problems. Hardly a decade later, some economists started looking

at the question how such labour market institutions have been formed in the first place. Agell (1999, 2002) argued that labour market institutions should be understood as social insurance devices against otherwise uninsurable risks.

This study has shed further light on this literature. For the uninsurable risks, I focused on international trade risks, which are measured by openness and an interaction term between openness and volatility in terms of trade. Several features of labour market institutions are analyzed. In order to control for unobserved heterogeneity and to analyze the long term development of the institutions, this study used a panel data of 40 years. For robust results, I used the extreme bounds analysis.

The statistical evidence is simple and clear. I have not found any evidence for the correlations between labour market institutions and country's exposure to external risk. This may be due to the fact that regulations in labour market not only provide social insurances, but also impose efficiency costs. Without further analysis with more sophisticated set-up, it is difficult to disentangle how social benefits determine the structure of labour market institutions, on one hand, and how efficiency costs are associated with those institutions, on the other.

From testing the hypothesis on ethnic fractionalization as a determinant of the institutions, I found robust evidence that the degree of ethnic fractionalization is negatively associated with several features of labour market institutions. This negative correlation extends the previous implications about the role of ethnic heterogeneity on public finance and provision further to labour market institutions context.

Finally, I would like to stress on the limitation of this study. The results of this analysis are only limited to external risk and ethnic fractionalization as potential determinants of labour market institutions. It does not cover any other

insurance motive. Also, there might be other factors that make "European" labour market institutions so different from those of "non-European" countries such as people's preference between equity and efficiency. Analyzing the relationship between citizen's preference and labour market institutions is a topic for the future research.

Appendix A Figures and Tables

Table 1: Descriptive Statistics for the Dependent Variables.

Y	Description	# Obs	Mean	Min	Max	Std. dev.
BD	Benefit duration index.	157	0.425	0	1.041	0.347
BRR	Benefit replacement rate.	157	0.392	0.016	0.769	0.187
EP	Employment protection index.	157	1.026	0	2	0.586
GOVC	Government consumption.	160	18.279	8.838	30.673	4.458
GOVEMP	Civilian government employment.	139	10.094	4.514	24.728	4.589
SSTRAN	Social security transfers.	160	13.084	2.26	27.5	5.020
TW	Tax wedges.	149	0.465	0.190	0.805	0.129
UDNET	Net union density.	157	0.416	0.09	0.900	0.180

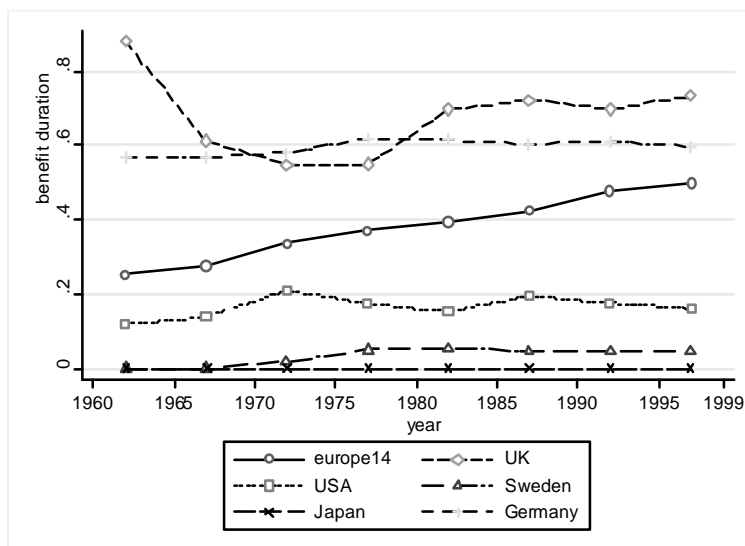


Figure 1: Development of benefit duration. *Note:* The index is increasing in received duration of unemployment benefits. "Europe 14" is unweighted averages of 14 European countries excluding the United Kingdom. *Source:* "Labour Market Institutions Database" by Nickell and Nunziata (2001).

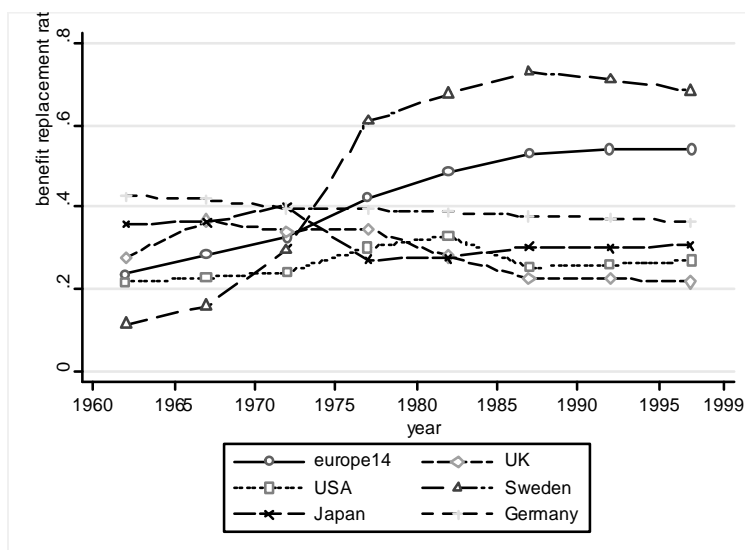


Figure 2: Development of benefit replacement ratio. *Note:* The index is a percentage of average earnings before tax. *Source:* "Labour Market Institutions Database" by Nickell and Nunziata (2001).

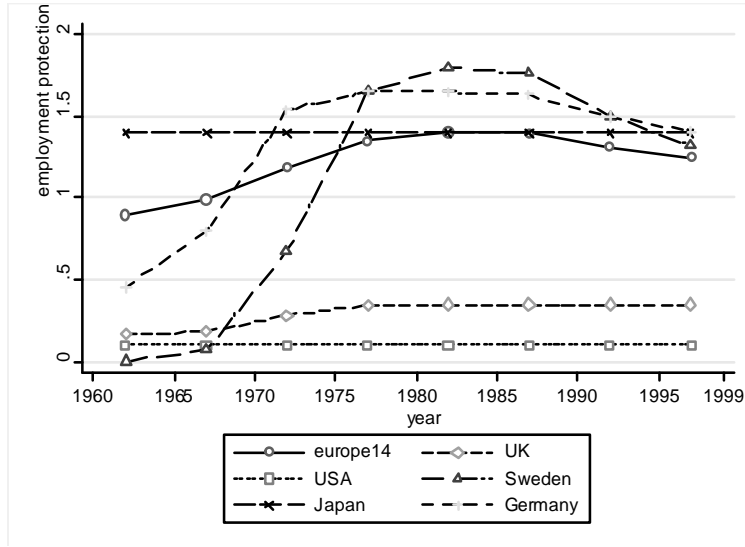


Figure 3: Development of employment protection. *Note:* The range of the EP-index is $[0,2]$ increasing with strictness of employment protection. *Source:* "Labour Market Institutions Database" by Nickell and Nunziata (2001).

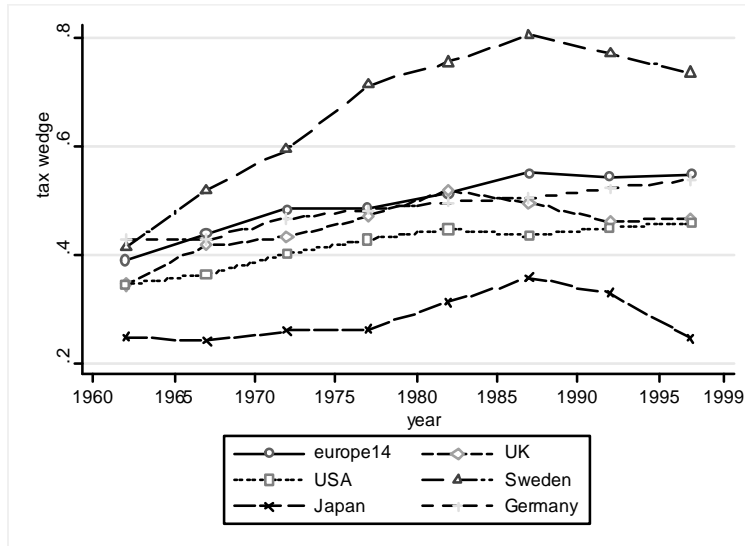


Figure 4: Development of tax wedge. *Note:* It is the sum of employment tax rate, direct tax rate, and indirect tax rate. The range is $[0,1]$. *Source:* "Labour Market Institutions Database" by Nickell and Nunziata (2001).

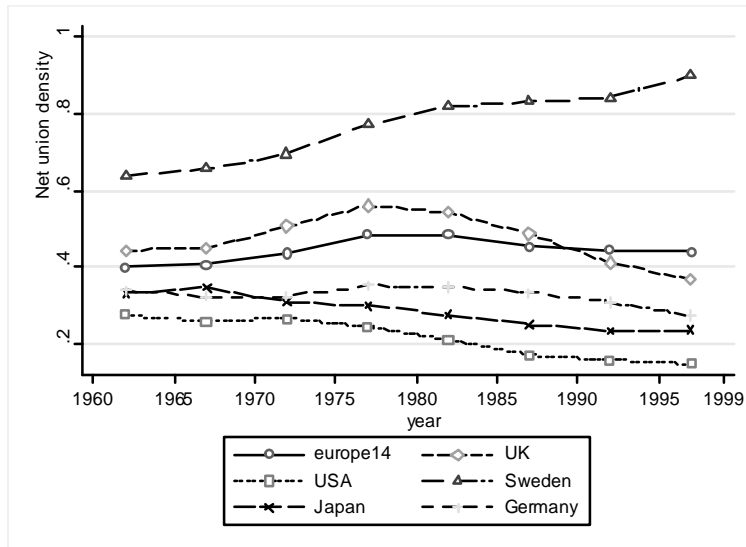


Figure 5: Development of net union density. *Note:* It is the ratio of total reported union members to the number of wage and salary earners. *Source:* "Labour Market Institutions Database" by Nickell and Nunziata (2001).

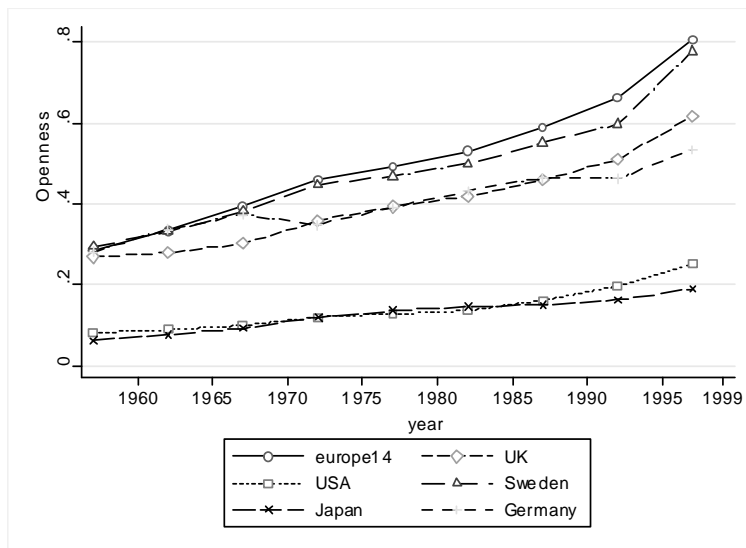


Figure 6: Openness of selected countries. *Note:* Openness is the ratio of the sum of exports and imports to GDP. *Source:* PWT 6.1.

Table 2: Descriptive Statistics for the Explanatory and Control variables

	L.H.S. Variables	Description	# Obs	Mean	Min	Max	Std. dev.
<i>M</i>	<i>open</i>	Openness.	160	40.873	5.382	124.192	22.315
	<i>exrisk</i>	Openness * terms of trade.	157	1.601	0.086	8.230	1.302
	<i>ethkrain</i>	Ethnic fractionalization.	160	0.157	0.01	0.75	0.200
<i>I</i>	<i>gdp</i>	GDP per capita.	160	15609.38	3851.96	30203.75	5122.39
	<i>popul</i>	Population.	160	36083.7	2483	271433	51810.8
<i>Z</i>	<i>depend</i>	Dependency ratio.	160	35.149	30.404	42.259	2.625
	<i>empind</i>	Employment in industrial sector.	160	33.870	22.14	50.18	6.320
	<i>right</i>	Right-wing cabinet composition.	152	39.116	0	100	34.715
	<i>finopen</i>	Financial openness index.	140	10.280	3	14	2.716
	<i>unemploy</i>	Unemployment rate.	152	4.882	0.022	19.6	3.725

Table 3: The Baseline Fixed Effects Estimation

Explanatory Variables	Dependent variables		
	BD	BRR	EP
<i>lnopen</i>	-0.048	0.087	-0.087
<i>exrisk</i>	-0.028**	0.025**	0.001
<i>ethkrain</i>	1.925***	-1.547**	-3.603*
<i>lngdpc</i>	0.302**	-0.250**	-0.242
<i>lnpopul</i>	-0.833***	-0.547***	-0.823**
Adjusted-R ²	0.873	0.669	0.865
	GOVC	GOVEMP	SSTRAN
<i>lnopen</i>	-0.052	-7.364***	3.634**
<i>exrisk</i>	0.028	0.171	-0.375**
<i>ethkrain</i>	-30.814***	-59.454***	-4.184
<i>lngdpc</i>	-3.654***	-1.727	-2.785*
<i>lnpopul</i>	-4.472*	-10.304***	-4.622
Adjusted-R ²	0.900	0.859	0.838
	TW	UDNET	
<i>lnopen</i>	0.067*	-0.016	
<i>exrisk</i>	-0.006**	-0.005	
<i>ethkrain</i>	-0.970***	-2.249***	
<i>lngdpc</i>	-0.068	-0.111**	
<i>lnpopul</i>	-0.086	-0.287***	
Adjusted-R ²	0.895	0.896	

Note: *, **, and *** indicate that the estimated coefficients are significant at the 10, 5, and 1 % level.

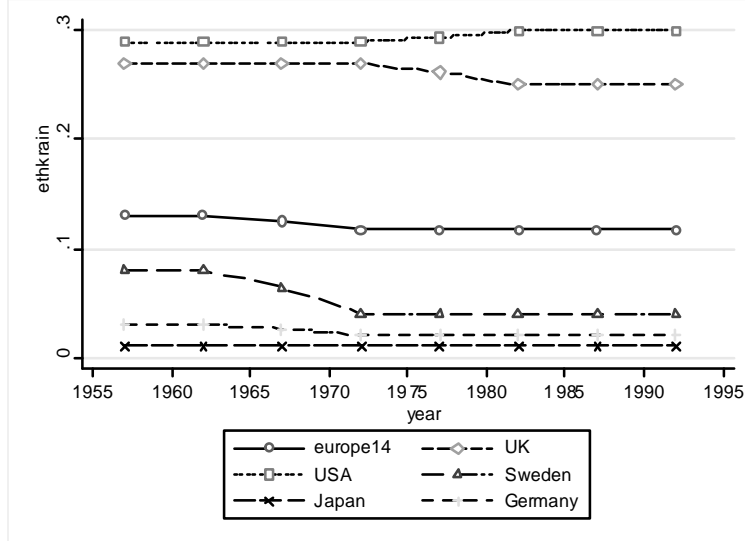


Figure 7: The ethnic fractionalisation index of selected countries. *Note:* It is measured every 10 years. *Source:* Krain (1997).

Table 4: The Summary of Sensitivity Analysis

	BD	BRR	EP	GOVC
<i>lnopen</i>	Fragile (0)	Fragile (0)	Fragile (0)	Fragile (0)
<i>exrisk</i>	Fragile (3)	Fragile (2)	Fragile (0)	Fragile (0)
<i>ethkrain</i>	Fragile (1)	Robust (-)**	Fragile (1)	Robust (-)**
	GOVEMP	SSTRAN	TW	UDNET
<i>lnopen</i>	Robust (-)**	Fragile (1)	Fragile (1)	Fragile (0)
<i>exrisk</i>	Fragile (0)	Fragile (1)	Fragile (1)	Fragile (0)
<i>ethkrain</i>	Robust (-)**	Fragile (0)	Robust (-)**	Robust (-)**

Fragile/robust indicates whether the M-variable is a robust or fragile regressor for the institutional variables according to Levine and Renelt's (1992) criteria. If fragile, the number in the parenthesis indicates how many additional Z-variables need to be added before the M-variable is insignificant or of the wrong sign. ** All the estimated coefficients of the M-variable are significant at the 5 % level, and of the same sign. * Equivalent at the 10 % level.

Table 5: The Summary of Sensitivity Analysis, only for the 15 European countries,

15 EU	BD	BRR	EP	GOVC
<i>lnopen</i>	Fragile (0)	Fragile (0)	Fragile (0)	Fragile (0)
<i>exrisk</i>	Robust (-)*	Fragile (0)	Fragile (0)	Fragile (0)
<i>ethkrain</i>	Fragile (1)	Fragile (0)	Robust (-)**	Robust (-)**
15 EU	GOVEMP	SSTRAN	TW	UDNET
<i>lnopen</i>	Robust (-)**	Fragile (1)	Fragile (1)	Fragile (1)
<i>exrisk</i>	Fragile (0)	Fragile (1)	Fragile (1)	Fragile (1)
<i>ethkrain</i>	Fragile (1)	Robust (-)**	Fragile (1)	Robust (-)**

See *Note* in Table 4.

Appendix B Descriptions and Sources of Data

The R.H.S. variables

open Openness in constant prices. The total trade, *i.e.* exports and imports, as percentage of CGDP. Source: Penn World Tables (*PWT*) 6.1. Note: Data for West Germany between 1955-1969 are taken from OECD National Accounts & Historical Statistics.

exrisk Openness * volatility in terms of trade. Volatility in terms of trade is standard deviations of percentage changes in terms of trade of goods and services, annual data between 1955-1995. Source: International Financial Statistics. Note: Missing data for Belgium, Denmark, France, and Portugal are from Global Development Network Growth Database, which is originally from Global Development Finance & World Development Indicators, World Bank.

gdpc GDP per capita in real GDP per capita (constant prices: Laspeyres). Sources: PWT6.1. Note: The missing data for Germany (1960-69) are estimated by Table 2. Real GDP per CAPITA, 1993 EKS Benchmark (United States = 100) of "Comparative levels of GDP per capita" from United States Bureau of labour Statistics. Prior to 1991, the data refer to West Germany.

unemploy Unemployment rate. The percentage of the people classified as unemployed as a share of the total labour force, 1955-2000. Source: Yearbook of labour statistics (ILO) in various years.

popul Size of population in thousands. 1960-2000. Note: Data for Germany are West Germany population (1960-90) and the unified Germany (1991-2000). Source: OECD National Accounts Main Aggregate Vol. 1.

depend The number of individuals aged below 15 or above 64 divided by the number of individuals aged 15 to 64, 1960-2000. Source: World Development Indicators (WDI) 2004, World Bank.

empind Civilian employment in industrial sector as a percentage of total civilian employment, 1960-2000 for all countries except Belgium and Netherlands (1960-97). Source: labour Force Statistics OECD.

ethkrain New Ethnic fractionalization Score by Krain (1997). Krain (1997) improved the accuracy of this variable slightly by recording the variable as strictly an ethnic fractionalization variable (see the paper for details) and by coding it at four years in the study, each separated by a decade: 1948, 1958, 1968, 1978. Note: The data end at year 1990. Source: Krain, Matthew (1997).

finopen Financial openness index. This index is the sum of index for restrictions on payments and receipts of goods and invisible, index for restrictions on payments and receipts of capital, and an index for legal international agreements that constrain a nation's ability to restrict exchange and capital flows. The result is a 0-14 measure of financial openness. The data are average of the annual financial openness index from Comparative Political Data Set 1960-1993. Source: "Comparative Political Data Set" by Klaus Armingeon, Michelle Beyer, Sarah Menegale.

right Cabinet composition of right-wing parties in percentage of total cabinet posts, weighted by days, 1960-2002. Source: "Comparative Political Data Set" by Klaus Armingeon, Michelle Beyer, Sarah Menegale.

The L.H.S. variables

BD Benefit durations. The index was constructed by Nickell and Nunziata as a weighted average equal to $bd = \alpha \frac{brr_2}{brr_1} + (1 - \alpha) \frac{brr_4}{brr_1}$, where brr_1 is the unemployment benefit replacement rate received during the first year, brr_2 is during the second and third year, and brr_4 is during the fourth and fifth year of unemployment. They give more weight to the first ratio than the second ($\alpha = 0.6$). Source: labour Market Institutions Database (LMIDB) version 2.00, 1960-1995 by S. Nickell and L. Nunziata (2001). Note: The series end at year 1995.

BRR Benefit replacement ratio. The data refers to first year of unemployment benefits, averaged over family types of recipients. Source and Note: See **BD**. The data is originally provided by OECD with one observation every two years.

EP Employment Protection. Range is [0,2] increasing with strictness of employment protection. Source: See **BD**. The data are originally provided by Blachard and Wolfers (2000), which were built chaining OECD data with data from Lazear (1990). They take a weighted average of indices

for notice period and severance pay measured by months putting a weight of one on the severance pay and a weight of 0.75 on notice. See "Data Appendix" of Blanchard and Wolfers (1999) for more detail.

GOVC General government final consumption expenditure in percentage of GDP, 1960-2000. Sources: WDI. Note: Missing data of Canada (1960-64), New Zealand (1960-70), and West Germany (1960-1990) are from "European Macroeconomics" by Manfred Gärtner, originally from Historical Statistics, sourceOECD.

GOVEMP Civilian government employment as a percentage of the working age population (15-64). Source: "Comparative Welfare States Data Set (LIS)". The data originally come from T.R. Cusack, Data on public employment and wages for 21 OECD countries, Science Center Berlin, May, 2004. Original sources for this data are various OECD publications. This data series updates to the public employment data presented in: T.R. Cusack, T. Notermans, and M. Rein (1989), "Political-Economic Aspects of Public Employment", European Journal of Political Research 17: 471-500 and T.R. Cusack (1991) "The Changing Contours of Government", Berlin: Wissenschaftszentrum Berlin Discussion Paper P91-304. Note: Portugal and Spain are missing.

SSTRAN Social security transfers as a percentage of GDP. Consists of benefits for sickness, old-age, family allowances, 1960-99. Sources: "Comparative Political Data Set" by Klaus Armingeon, Michelle Beyeler, Sarah Menegale. The data are originally from OECD Historical statistics of various years, Table 6.3. Missing data of Portugal (1961-67, 1977-79) and Spain (1961-1967) are calculated from accounts for general governments in SourceOECD National Accounts Statistics. Note: Missing data of New Zealand (1983-99) are calculated by the author using OECD Social Expenditure Database, www.oecd.org/els/social/expenditure.

TW Tax wedges. It is equal to the sum of the employment tax rate, the direct tax rate, and the indirect tax rate. Source: All data come from London School of Economics CEP - OECD National Accounts, updated by Nickell and Nunziata. Note: See **BD**.

UDNET Net Union Density. It is constructed as the ratio of total reported union members (gross minus retired and unemployed members). Source: Nickell and Nunziata obtained the data from *inter alia* Visser (1996), Huber et al. (1997), Ebbinghaus and Visser (2000). Note: See **BD**.

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